

# **INTERNAL GUIDANCE MANUAL**

## **N.C. DIVISION OF WATER QUALITY STREAM CLASSIFICATION METHOD**

*January 19, 1999*

*Version 2.0*

### **Introduction**

This stream evaluation method is intended to distinguish ephemeral channels from intermittent channels. The numerical rating system format was developed based on repeated requests from the regulated community for an objective method of stream evaluation. The 19 point minimum score for determining an intermittent channel was based on the results of over 300 individual field trials conducted in the Piedmont and Coastal Plain portions of the Neuse River Basin during May, June, July and August of 1998, as well as field testing conducted during December 1998 and January 1999. The four tiered weighted scale used for this system is in response to the intrinsic variability of stream channels. The score ranges were developed in order to better assess the often gradual (and sometime variable) transition of streams from ephemeral to intermittent.

Previous versions of this form used a “yes”/ “no” format and was found by NCDWQ staff and by the regulated community to be inadequate to properly encompass and assess the natural variability encountered when making stream determinations in the field. Moderate characters are intended as an approximate qualitative midpoint between the two extremes of Absent and Strong. The remaining qualitative description of Weak represents gradations that will often be observed in the field. The “in between grades” are intended to allow the evaluator the required flexibility in assessing inherently variable features. In addition, the small increments in scoring between gradations will help reduce the range in scores between different evaluators.

### **How To Use The Classification**

#### ***1. The Classification Form***

The four tiered weighted scale is designed to encompass the range in variability of each character likely to be observed in the field. The Primary and Secondary indicators are weighted to reflect the relative importance that each character has in determining Intermittent channels from Ephemeral channels. Absent, Weak, Moderate, and Strong are defined below. **These definitions are intended as guidelines.** Personal experience and best professional judgement should also be employed in conjunction with these guidelines when evaluating streams. The evaluator must select the most appropriate number for each variable—selection between those in the form is not allowed.

**Absent:** The character is not observed. (On a scale of 1 to 10, Absent = 0)

**Weak:** The character is present but you have to search intensely (i.e., ten or more minutes) to find it. (On a scale of 1 to 10, Weak = 1, 2, or 3).

**Moderate:** The character is present and observable with mild (i.e., one or two minutes) searching. (On a scale of 1 to 10, Moderate = 4, 5, or 6).

**Strong:** The character is easily observable. (On a scale of 1 to 10, Strong = 7 to 10).

### **Examples:**

*(\*\*These are intended as guidelines and the numbers given are provided only for a general reference. The numbers **should not necessarily** be taken literally\*\*).*

**Fish: Absent:** No fish, even after an intense 10 minute search of a large (e.g., 200') liner stretch of stream. Fish sampling should be conducted visually and with a dip net.

**Fish Weak:** One or two fish found after an intense search.

**Fish Moderate:** After a mildly intensive search (i.e., 1 or 2 minutes), you see four or five individual fish, **or** one small school.

**Fish: Strong:** Upon casual observation, you see a half dozen fish **and/or** two or three small schools.

**Meanders: Absent:** The stream is straight.

**Meanders: Weak:** Nearly all of the stream is straight, only one or two very small bends.

**Meanders: Moderate:** Most of the stream is straight although there are a few bends. One or two of these bends may be large.

**Meanders: Strong:** Large portions of the stream bend. The bends will mostly be large or exaggerated.

## **II. Field Use Of The Classification System**

### **A. Channel Assessment Methodology**

Streams are drainage features that change from ephemeral to intermittent to perennial along a gradient or continuum—often times with no single distinct point demarcating these transitions. In order to determine ephemeral streams from intermittent ones using this classification system, the field evaluator must exercise caution. Determinations must not be made at one point without first walking up and down the channel. This initial examination allows the evaluator to examine and study the nature of the channel, make judgements about what is happening in the watershed, and make mental notes (based on the characters used in the classification form) about where along the reach in question the channel likely changes from ephemeral to intermittent. As a general rule of thumb, several hundred feet (sometimes much more) of channel should be walked to make these determinations. It is not possible to make decisions regarding ephemeral versus intermittent from evaluating a single point along the channel.

### **B. Addressing Weather Induced Variability**

As channels convey water, their rate and duration of flow is influenced by recent and long-term weather. In order to “filter” out some of this variability, it is **STRONGLY** recommended that field evaluations be conducted at least 48 hours after the last known rainfall. However, please note that the classification method has been designed with enough built in redundancy to allow for reasonably accurate ratings even after a recent rainfall.

## **Primary Indicators**

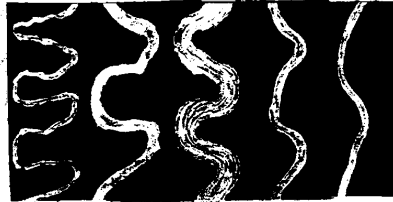
### **I. Geomorphology**

**#1 Riffle-Pool Sequence.** Pools: Areas of slow moving water. These usually form where the stream widens. Riffles: Shallow areas extending across the streambed where the water moves faster. Usually these areas occur when the stream narrows. Sometimes this faster moving water runs over small rocks, cobble or pebbles (although rocks aren't always needed for a riffle).

**#2 USDA Texture In Streambed:** Is the material comprising the bottom of the stream different than the material comprising the surface of the ground surrounding the stream? (For example: Are there small pebbles, gravel or sand in the stream whereas the surrounding land is covered with leaves or topsoil, etc.)?

**#3 Natural Levees:** Are there large “mounds”, “hills”, or broad low “ridges” of sand or silt deposited parallel (or nearly so) to the stream on its floodplain and adjacent to one or both of its banks? These features may be covered with trees and shrubs or they may be barren sand or silt.

**#4 Sinuosity:** Does the stream bend? Are there curves in the stream? These bends or curves can be small or large. More formally, sinuosity is the ratio of the length of the channel to the down valley distance (i.e., 1:1 = straight channel).



**#5 Active (Or Relic) Floodplain:** A flat (or nearly flat) lowland that borders a stream, is covered by its waters at flood stage, and is built of organic matter and/or alluvium due to overbank deposition. These areas may have plants adapted to wet areas growing on them. Small floodplains can be found “inside” the stream’s banks in deeply incised channels. More frequently, floodplains are outside of the stream’s banks.

**#6 Braided Channels:** Are there more than one small stream channels that cross or “braid” over one another. This usually occurs in areas where the land flattens significantly and where there is abundant sediment supply in a wide streambed with shallow water flow.

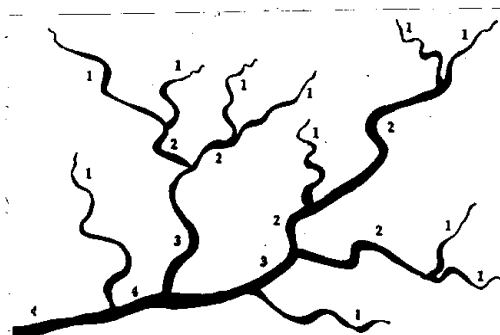


**#7 Recent Alluvial Deposits:** Are there recent deposits or accumulations (in the stream or on adjacent floodplains) of sand, silt, cobble, or gravel?

**#8 Bankful Bench:** When you look at the side of the streambank is there a nearly continuous “bench” eroded into the channel which has accumulated sand or silt. This area is often covered with plants. In dry times when the stream is low, you can often see it part way up the bank. In wet times you may not be able to see it as the stream will be flowing over the bench.

**#9 Bed And Bank:** Is the water in the stream in a well-defined channel surrounded or “contained” by a higher bank area. In small streams the bank may be very low (sometimes only a few inches) and may not necessarily be a continuous feature.

**#10 2<sup>nd</sup> Order Or Greater Channel:** To your knowledge (you can look at SCS County Soils Survey Maps or U.S. Geological Survey Maps, or use field observations) is the channel that you are looking at have one (or more) other channels flowing into it?



## **Primary Indicators**

### **II. Hydrology**

**#1 Ground Water:** Seeps: Usually seeps have water dripping or slowly flowing out from the ground or from the side of a hill. Water Table: If you dig a hole in the ground near the stream (not in the streambed) of approximately a foot deep and water fills it (usually this will be a slow process) the water table is high and may help keep the stream flowing in dry seasons. High water tables are most common in the Coastal Plain.

## **Primary Indicators**

### **Biology**

**#1 Fibrous Roots:** When you look in the bottom (or edge) of the stream, are there very small (almost “hair-like”) roots there? Fibrous roots do not include roots larger than half the thickness of a finger and are not generally “woody” in appearance or consistency.

**#2 Rooted Plants In Streambed:** Are there plants growing in the **bed** of the stream? Plants growing on any part of the bank of the stream should not be counted.

**#3 Periphyton:** When you look on rocks, logs, plants, or twigs in the water is there a “slimy” or “spongy-leafy” growth of algae or very small plants present? Usually the color is a brown-green or dark brown, although this growth can take on the color of the silt or sediment present in the stream.

**#4 Bivalves:** Are there clams or mussels in the stream? To look for them, dig around in the streambed or look for them where plants are growing in the streambed. Also, look for empty shells washed up on the bank. Some bivalves (e.g., Fingernail clams) can be pea-sized or smaller.

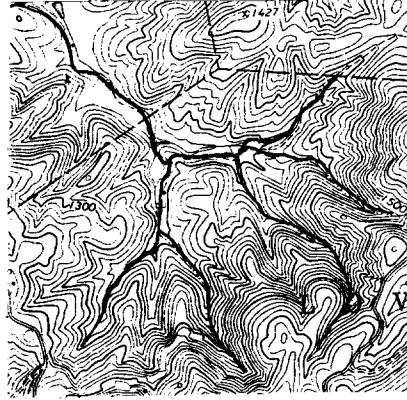
## **Secondary Indicators**

### **I. Geomorphology**

**#1 Head Cut:** An abrupt vertical drop in the bed of a stream channel. It often resembles a small intermittent waterfall (or a miniature cliff). Intermittent streams sometime start at these areas.

**#2 Grade Control Point:** Often this feature is distinguished by a large rock outcrop in the channel or by a large root which extends across the channel. These structures separate an abrupt change in grade of the stream bed.

**#3 Topography Indicating A Natural Drainage Way?:** When looking at the local topography in the field (or on a U.S. Geological Survey Map) does the land slope towards the channel (or are the contour lines fairly close together and roughly sinuous in shape and thereby indicating a “draw”?). In other words, does the land have slopes that seem to drain to or indicate a natural drainage way?



## **Secondary Indicators**

### **II. Hydrology**

**#1 This (Or Last's) Years Leaf litter Present In Streambed:** Are there leaves (freshly fallen, or some may be “blackish” in color and/or partially decomposed) present in the streambed?

**#2 Sediment On Plants (Or Debris):** Are plants (or rocks, logs, or other debris) in the stream (or on the streambank or flood plain) stained white, gray, red, brown, or reddish-brown with sediment?

**#3 Wrack Lines:** Are twigs, sticks, logs, leaves, or other floating material (including litter such as plastic soda bottles, beer cans, styrofoam, etc.) piled up on the upstream side of obstructions in the stream, on the streambank, and/or in the floodplain?

**#4 Water In Channel >48 Hrs. Since Last Known Rainfall:** Intermittent streams do not always have water in them. Water in intermittent channels may linger in pools or holes in the streambed. A good rule of thumb for distinguishing intermittent streams from ephemeral ones is if they have water in them for more than 48 hours since the last rain.

**#5 Water In Channel During Dry Conditions Or In growing Season?** Intermittent streams do not always have water in them. Look for water in pool areas or in holes in the streambed. Another good rule of thumb for differentiating ephemeral streams from intermittent ones is if they have water in them during dry (drought) conditions or during the growing season.

**#6 Hydric Soils In Sides Of Channel (Or In Headcut):** Are hydric soils present in the sides of the channel or in the headcut? Use a soil auger to sample these areas for hydric soil indicators.

## **Secondary Indicators**

### **III. Biology**

**#1 Are Fish Present:** Look for fish in pools or other areas of standing water in the stream. In addition, look under overhangs in the bank, near tree roots, on the downstream side of rocks or other large obstructions, or in and around plants.

**#2 Are Amphibians Present:** Look for frogs near the bank and in the water (also look for tadpoles in the water). Salamanders may also be found under rocks, logs, or leaf packs in the stream or in very moist leaf litter, moss, or logs (and under rocks) next to the stream.

**#3 Are Aquatic Turtles Present:** Look for turtles on rocks or logs in the stream or in and around rocks and logs in areas adjacent to the stream. Also look for turtles basking in areas exposed to sunlight.

**#4 Crayfish:** Look for crayfish in small pools, under rocks, under logs, sticks or within leaf packs in the stream. Additionally, look for small holes in the muddy streambank or look for distinct “chimneys” (roughly cylindrical chimneys) on the muddy bank.

**#5 Macrobenthos:** Look under rocks, logs, twigs, and leaf packs. Also look under the streambank and in (and on) any vegetation in the stream. If you have a dip net, drag it around the streambank and in any vegetation or leaf packs present. If you have a kick net set it up downstream of any riffles and kick (and “wash”) the rocks in the riffle so that the material disturbed is caught in the downstream net. The use of nets for this step is strongly recommended.

**#6 Iron Oxidizing Bacteria/Fungus:** In slow moving (or stagnant) areas of the stream are there clumps of “fluffy” rust-red material in the water? Additionally, on the sides of the bank (or in the streambed) are there red or rust colored stains (usually an “oily sheen” or “oily scum” will accompany these areas) on the soil surface? These features are often (although not exclusively) associated with groundwater.

**#7 Filamentous Algae:** In slow moving areas (or in pools or stagnant areas) are floating green algae (usually not attached to rocks or logs) present?

**#8 Wetland Plants In Streambed:** Are plants usually associated with wet areas present in the streambed? For example, cattails or black willow? (For determining OBL, FACW, FAC, FACU, or UPL **See Appendix I**) . Submerged aquatic vegetation (SAV) includes rooted plants that generally grow totally submerged under the water’s surface.